Novel Wastewater Treatment System for Automotive Manufacturing

" ZenoGem® technology and its application to the unique wastewater problems within the automotive manufacturing industry is the result of over 15 years of research and development by Zenon. The General Motors Windsor project is the final product. General Motors can now meet any discharge limitations imposed by the Great Lakes Initiative regulations. Zenon is committed to refine and continuously improve the ZenoGem® process to ensure that future requirements within the automotive industry are met. "

John Coburn
President
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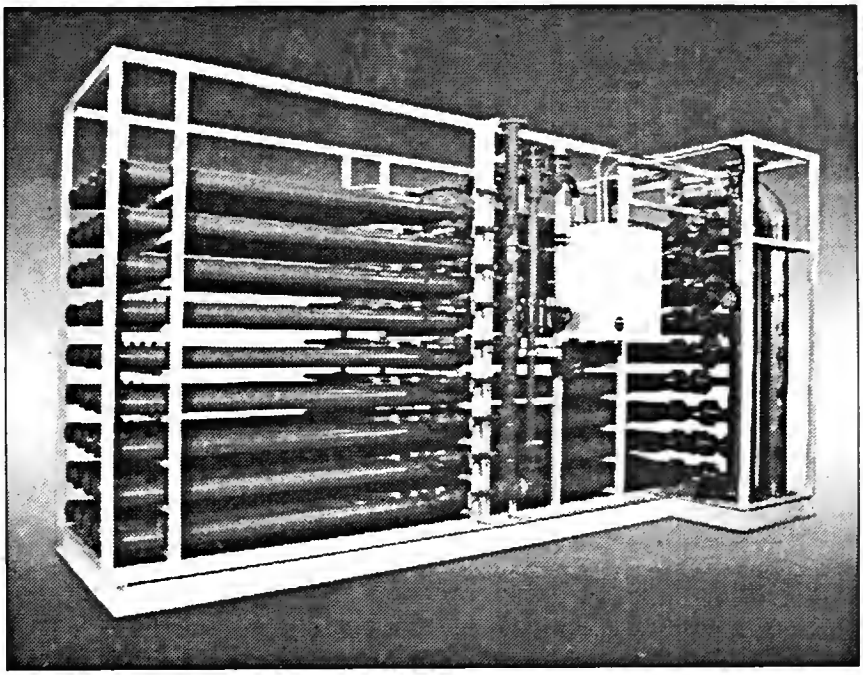

The ZenoGem® system.

THE COMPANY

Zenon is a world leader in providing products and services that use ultrafiltration membrane technology for water purification, process separation, and wastewater treatment and recycling. The Zenon group of companies operates from five locations in North America and three in Europe. Zenon's products and services are marketed for a variety of industrial, institutional, and governmental applications worldwide.

THE CHALLENGE

Automotive manufacturing facilities use large amounts of synthetic fluids and natural oil-based products in a variety of metal-working operations. This results in large amounts of high-organic-strength, oily wastewaters that need effective treatment.

Many existing wastewater treatment systems use conventional physical/chemical or biological treatment technologies. These conventional technologies preclude the use of cost-saving alternative metalworking fluids, are costly to operate and maintain, generate large quantities of sludge and other by-products and are becoming unsuitable for meeting today's environmental regulations.

The ZenoGem® process not only overcomes these problems but also makes it possible to reuse the treated water, offering the potential of zero-discharge manufacturing plants.

The system has progressed from initial pilot-scale studies and small-scale demonstrations to a full-scale installation and demonstration at General Motors of Canada Ltd.'s power train transmission plant in Windsor, Ontario.

TECHNOLOGY DESCRIPTION

The ZenoGem® system is an advanced activated sludge process. Its ultrafiltration membrane technology is the heart of a highly efficient, high-concentration aerobic biological treatment system.

The ultrafiltration membranes filter the water prior to discharge or recycling and retain the biological solids in the bioreactor. Higher-molecular-weight, soluble materials that would pass through conventional clarifiers and filters are also returned to the bioreactor for further biodegradation. Virtually all suspended solids and biomass are removed from the final effluent, regardless of raw waste composition, bioreactor conditions, biomass settleability and other variable operating conditions.

With the ultrafiltration membranes, the fluid retention time and the solids retention time can be selected independently. This flexibility allows the system to be configured to the application. The concentration of bacteria in the bioreactor can be increased by as much as an order of magnitude over conventional biological treatment systems. This results in lower sludge production.

The ZenoGem® process is ideally suited to a variety of applications, such as those where:

* the wastewater contains significant quantities of emulsified oil and grease, or suspended solids that do not settle out easily;

- the wastewater has variable strength or is vulnerable to manufacturing plant process upsets;
- sludge disposal costs are a significant contributor to the treatment cost;
- an opportunity or need exists to recycle the treated water into the plant for reuse;
- nitrification is needed;
- retention of certain soluble contaminants is critical to achieving treatment objectives;
- there are tight space constraints.

RESULTS

In all trials to date, ZenoGem® systems have demonstrated superior effluent quality, due to the absolute filtration achieved, and reduced vulnerability to process upsets. Typical performance results include:

	Reduction
Biological oxygen demand (BOD5)	>97%
Chemical oxygen demand (COD)	>92%
Total fats, oils and greases (TFOG)	>97%
Hydrocarbon fats, oils and greases (HFOG)	>98%
Sludge production	to <0.1 kg / kg COD removed

The effluent produced by ZenoGem® has been shown to be virtually devoid of suspended solids. In addition, the system has been shown to effectively treat oily wastewaters containing natural oil-bases as well as semi-synthetic and synthetic metalworking fluids.

TECHNOLOGY OPPORTUNITIES

In North America and Mexico there are hundreds of automotive-related industries that would benefit from this technology. As effluent discharge requirements become more and more stringent, ZenoGem®'s potential market is expanding greatly.

PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

The demonstration of this technology was partly supported by the ministry.

Industrial companies located in Ontario may seek ministry/industry services which will help them:

- reduce, reuse and recycle solid waste;
- effectively remediate historic pollution and destroy hazardous contaminants;
- reduce or eliminate liquid effluent and gaseous emissions;
- use energy and water more efficiently.

Equipment and services supply companies can benefit from the information provided on technologies identified for business development.

FOR FURTHER INFORMATION, PLEASE CONTACT:

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MINISTRY OF THE ENVIRONMENT SERVICES

For information on Ministry of the Environment assistance to industry, please contact the Environmental Partnerships Branch at (416) 327-1492, Fax (416) 327-1261

For more project profiles and other publications, visit the ministry's website at http://www.ene.gov.on.ca

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